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ABSTRACT

Three current views of the English orthographic system defend this system as adequately spelling contemporary American English. The validity of these views is questionable, as are the implied presuppositions on which they are based. The three perspectives may also be investigated in terms of their adequacy and internal consistency. The major thrust of the inquiry stems from the suggestion that a spelling system such as the one used by English speakers discriminates against the children of the lower classes because they do not live in an environment which gives occasion to use the linguistic forms enshrined in the orthography. Children of the upper classes, however, live in an environment which gives them greater opportunity to use the forms reflected in the English orthography. Based on these assumptions, current English spelling favors the children of the bureaucratic elite and thus has an implicit racist bias. (SW)

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ELITISM, RACISM AND SOME CONTEMPORARY VIEWS OF ENGLISH SPELLING

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Introduction

This discussion focuses on three current views of the English orthographic system which defend this system as adequately spelling contemporary American English. These views are examined, their validity is questioned and the implications of the presuppositions on which they are based receive a careful scrutiny. Furthermore, the three perspectives are investigated in terms of their adequacy and internal consistency. The major thrust of the inquiry is couched in the suggestion that a spelling system such as the one used by English speakers discriminates against the children of the lower classes because they do not live in an environment which gives occasion to use the linguistic forms enshrined in the orthography. Children of the upper classes, however, live in an environment which gives them greater opportunity to use the forms reflected in the English orthography. In this sense, current English spelling favors the children of the bureaucratic elite and thus has an implicit racist bias.

Elitism, Racism and Some Contemporary Views of English Spelling

". . . there is clear evidence that the privileged use their false beliefs about language to the disadvantage of the deprived." (Wayne O' Neil, The Urban Review, II, No. 7)

Although O'Neil was not thinking specifically about attitudes of English speakers towards the spelling of their language when he made the above statement, he could well have included them in his observation. Mankind, the English speaker, very often equates spelling ability with general intelligence. Lloyd and Warfel quite some time ago highlighted this very cultural attitude in a quaint, contrived incident:

> Businessmen, college professors, and office managers complain of the writing of high-school and college graduates, especially of their spelling as it shows up in letters of application, interoffice memos, reports, surveys, and summaries. The young person, affable, alert, and capable though he may be, is not there to speak for himself; his only presence is in his writing. Often the first eye to see his writing is that of a person hardened by years of struggling for status in the system, a secretary, an office manager, or some clerk whose only task is to receive these

> papers and channel them to their destination. "What do you think of this boy Earnest Endeavor?" asks the boss casually, taking the papers from her hand. "Well, honestly! He can't even spell," she replies, and the shadow of the eight ball falls across his career.[1]

These authors, furthermore, were not the first to notice this fallacious inclination of English speakers towards their spelling system. Veblen in his work, The Theory of the Leisure Class (1898), works towards this conclusion from an examination of English spelling.

> As felicitous an instance of futile classicism as can well be found, outside of the Far East, is the conventional spelling of the English language. A breach of the proprieties in spelling is extremely annoying and will discredit any writer in the eyes of all persons who are possessed of a developed sense of the true and the beautiful. English orthography satisfies all the requirements of the canons of reputability under the law of conspicuous waste. It is archaic, cumbrous, and ineffective; its acquisition consumes much time and effort; failure to acquire it is easy of detection. Therefore it is the first and readiest test of reputability in learning, and conformity to its ritual is indispensable to a blameless scholastic life.[2]

For my own part, my attention was redirected to the problem of English spelling when the fact of reading disability in the United States was forcibly presented to me at an

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educational conference focusing on problems of teaching minority group students. There it was pointed out that, although 2% percent of the population in the United States suffers from serious reading disabilities, the rate climbs to 80 to 90 percent in the ghettoes. Compared to this, it is estimated that a country such as Norway has a reading disability rate of five percent.[3] Now, it is also very interesting that, in the latter part of the nineteenth century, Norwegians wrote and spelled in the Danish language since they were subject to Danish masters. After they had broken away from Danish rule, the people of Norway debated for some time whether they should use as their written language a historically based spelling of local dialects which came to be known as Nynorsk or whether they should use a modified form of the Danish language and spelling which came to be known as Bokmål or whether they should use a synthesis of the two. The debates resulted in three major spelling-language reforms in 1907, 1917 and 1938. As a result of these reforms, although Norwegian spelling is not completely phonetic or phonemic, Einar Haugen, an American linguist, can make the following statements about the relationship of Norwegian spelling of the two dialects or languages to the spoken dialects or languages:

1. Any given spelling will normally have the same pronunciation in both languages.
2. In all main features one can say that any word which can be pronounced alike in both languages will be spelled alike.

3. This success (as in 1 and 2 above) has greatly reduced the burden of learning to spell, without making the process foolproof in either language.
4. It has also made possible the introduction into either language of any word or form used in Norwegian dialects without the serious distortion of its sound that was quite normal in the period of Danish spelling.
5. It has stopped and even reversed the trend toward spelling pronunciation based on Danish spelling.[4]

Now, of course, it would be folly to attribute the success of Norwegian students in reading solely to the nature of spelling in the Norwegian language. Undoubtedly, cultural attitudes towards education and literacy, the more or less unilingual nature of the Norwegian population and other factors help to make the Norwegian success story in reading the envy of at least one American educator.[5]

But it is interesting to note that, in the rhetoric surrounding the Norwegian spelling reforms, some spokesmen viewed these reforms as the key to educating the masses and the tool for loosening the grip of the elite on their privileged position. For instance, Haugen quotes the Norwegian linguist, Hjalmar Falk, as saying:

> . . . it (the traditional orthography) is 'a class stigma, a shibboleth, since children from cultivated homes have a certain familiarity with it from their reading, while it

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will always be a stumbling block for the children of the people.'[6]

Similarly, Moltke Moe, another Norwegian linguist, is reputed to have stated that the spelling system in Norway prior to the turn of the century made the path to education ". . . still narrower and more arduous" for the common man.[7] Another writer in the controversy surrounding the spelling reform of 1938 saw language as a "social phenomenon" and said that its form was "ascribable to the bureaucratic elite which dominated the country in the nineteenth century. Democratization had now put an end to the rule of the elite, and now it was time that 'the people should be allowed to determine how the riksmål, the official language of the country, ought to look.'"[8]

From this it would appear that, if the traditional English orthography is inefficient, and if an inefficient spelling system does in fact make education harder for the lower classes, then the conventional orthography of English does favor the bureaucratic elite, the upper and the middle classes. Thus, the English spelling system may contribute to the elitism in the society and that elitism in the view of some minority groups is known as racism. From this point, little or no attempt will be made to investigate further the relationship of educational problems to inefficient spelling systems. Three current views of English spelling will be examined, however, their validity will be questioned and the implications of the presuppositions within them will be discussed.

Now it has always been my perception that English is not spelled too well. Probably this is due to the fact that I find it necessary to keep a dictionary close to my typewriter. This may also be attributable to the fact that, in my first year as a teacher of freshman English, the department discussed a rule, three spelling mistakes and the paper is automatically failed. During the discussion one of my previous mentors, now turned colleague, announced to the whole English department faculty: "If that rule had been in effect while Ney was an undergraduate, he never would have made it." Similarly, I have always understood that, for languages such as Spanish and Finnish where the spelling system is at least more regular than English spelling, the teaching of spelling occupies the first six or seven years of school life; in English, the teaching of spelling is a never-ending academic venture. In the same way, the failure for spelling bees to develop in the Spanish culture, for me, has always been attributable to the fact that Spanish is relatively easy to spell: contests seldom develop in doing the obviously easy thing. Nevertheless, at present, the English spelling system is finding some very prestigious defenders from well known academicians engaged in various aspects of the teaching of or about the English language.

Foremost among the defenders of the current state of English spelling are the transformational, generative or transformational-generative linguists. Most of the attempts to explain and defend English spelling on the part of linguists who espouse the transformational cause stem from the statement by

Chomsky and Halle "that conventional orthography is . . . a near optimal system for the lexical representation of English words"[9] and their description of English phonology which indirectly supports this statement. The Chomsky and Halle work is sufficiently complex and extensive to guarantee a prolonged resistance to extensive review, but it is possible to examine the arguments of the Chomsky and Halle proposal first as they are seen in the works of their followers and then as they are seen in the original work itself.

Ralph W. Fasold, for instance, gives his version of the Chomsky and Halle hypothesis in the anthology, Teaching Black Children to Read. First, he rejects a phonetic spelling as being untenable because it would not be desireable to record all features of human vocal sounds used in language and because of variation in sound from one utterance to another. He rejects phonemic spelling because it leaves a number of spelling anomalies and because ". . . the justification of the phoneme as a linguistic entity has been called into serious question" by Chomsky and Halle.[10] He then advocates the Chomskyan view that ". . . alphabetic symbols represent phonological segments on a more abstract level."[11] His first example involves the English word street. Here his argument rests on the fact that if there are three consonants at the beginning of a word in English, and if the middle one is t, the other two consonants are entirely predictable; they are s and r. Hence the English word street could be re-spelled 0t0eet, the two zeroes simply indicate missing consonants. It is hard to believe that a linguist should seriously present such an argument in a

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paper on reading; with the present state of the writing tradition, the child has to supply many cues before he can relate the written language which he may not know to the spoken language which he knows. To force him to supply even more cues would seem to be counter-productive. Furthermore, although this example gives insight into the concept of an abstract level of representation for phonological segments, it does not involve English orthography as it presently exists. Thus, no further discussion of it will be undertaken.

Fasold then moves onto a justification of spelling from what might be called the phonological identity criterion. Stated simply, this criterion requires that the letter used to spell a word refer to some surface or underlying phonological form in the spoken language. Fasold's version of the argument centers on the spelling of mussel which could be phonemically represented as /məsɨl/. This is not difficult to do since the _u_ of mussel consistently represents /ə/ as in hut, sun, nut and so on. Similarly, double _s_ is used to differentiate /s/ from /z/ in items like his /hiz/ and hiss /his/ and so on. But it never seems to occur to Fasold that the spoken word which can phonemically be written /məsɨl/ can also have the orthographic shape, mu_sle, and that most Black children will encounter muscle before they encounter mussel in their reading. Thus if the first spelling, mussel, is justifiable on the basis of the phonological identity criterion, obviously the spelling muscle cannot be justified on the basis of the same criterion. That this should be included in a volume on Teaching Black Children to Read

following the statement that the Black child ". . . may lose confidence in the alphabetic principle"[12] is a tribute to the pluralistic nature of American education. But it is scarcely a tribute to this example of thinking from the transformational viewpoint. Too often, as in the above instance a pars pro toto argument is used to justify generalizations which are hard to support in any other way. Chomsky and Halle themselves may be forced into this kind of fallacy since it appears that their major work on the English sound system and, incidentally, on English spelling, The Sound Pattern of English, deals largely with English words of Romance derivation.[13] Their conclusions, supported by evidence from the spelling of the Latinate vocabulary, are applied to all segments of English vocabulary.

The spelling of muscle with a c in it is justified by transformationalists on the basis of what might be called the morpheme identity criterion. This criterion might be stated simply as requiring that similar morphemes have similar visual representations. Thus sane and sanity have the same spelling for the morpheme san- even though the surface phonological realization of the morpheme has two different vowels, sane /seyn/ and sanity /sæniti/. This argument takes a different form when it is used to justify the spelling of long, bomb and autumn. Here, the base forms of the words have a "silent" consonant which is realized as a surface phonological form in the compounds as in the sets long -- longer, bomb -- bombastic and autumn -- autumnal.[14] But what is to be said of thumb and lamb, the first of which has no common compound with a realized b and the second of which ought not to

be identified with *amoaste*? Similarly, what justification is there for the sets *sing* -- *singer*, *wring* -- *wringer*, *sting* -- *stinger* and so on in which the *g* of the compound has no surface realization. At this point, the argument demonstrates that there are two different *-er* morphemes involved: the one means, 'agent'; the other means, 'comparative adjective.' When the agent *-er* is used, the *g* is not pronounced as in most pronunciations of *singer*, but when the comparative *-er* is used, the *g* is pronounced as in *longer* and *stronger*. Now this is undoubtedly true, but I myself would not want to be responsible for explaining this distinction to elementary school children who may have difficulty in deciding which *-er* morpheme is present in any given lexical form. And even if the principle were easy to explain, it seems to me to be hardly worth the effort since the set containing such items as *strong* -- *stronger* is smaller than the set containing the items *sing* -- *singer*. Similarly, even if the spelling *muscle* can be justified by the morpheme identity criterion on the basis of the fact that the *c* is realized as a surface form in *muscular*, might it not be wise to argue for the spelling of *muscle* as **muscel* by analogy to *mussel* or even as **muscul* so that the morpheme identity criterion is preserved intact for *muscular*?[15] What is there about either the phonological identity criterion or the morpheme identity criterion which requires that all spellings be justified on the basis of these criteria since some spellings can be?

Now, to return to the previously mentioned work by Chomsky and Halle, the first thing that educators who are applying the

findings of this work to problems of reading, writing and spelling should understand is that it deals largely with stress placement in English vocabulary items and with the presence or absence of stress changes in those items as prefixes and suffixes are added to them. It is for this reason that the work deals largely with Romance cognates in vocabulary: it appears that the latinate vocabulary of English is most productive of suffixation and prefixation. Thus, the changes or lack of changes of English sounds as suffixes and prefixes are added to the different roots is also treated. From this point, the justification of phlegm /flem -- phlegmatic /flegmæ tik/ is not problematic on the basis of the morpheme identity criterion. In the same way, for the sets music -- musician, logic -- logician, the spelling maintains a constant graphic form for related lexical items even though the _c_ represents /k/ at one point and /š/ at another.[16] The same can be said for plenum -- plenitude where _e_ represents first /ey/ and then /e/.[17]

For this reason, too, given the evidence in the long awaited The Sound Pattern of English, the statement about conventional orthography in English constituting an optimal systems follows quite logically. But there is little evidence in this work to indicate that the authors have grappled with the well-known ough graphic combination and its relation to seven different vowel or vowel and consonant combinations or with the fact that in sweat, great and meat the digraph _ea_ represents three different vowel nucleii. Moreover, if the English spelling is optimal because it forces a visual equation of vital

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and vitality or serene and serenity thus satisfying the morpheme identity criterion, is it by the same argument confusing and inefficient because it forces a visual equation of grate, 'a frame of parallel crossed bars,' and grateful, 'full of gratitude'? After all, the student of English reading does have sets such as plate -- plateful in which the latter signifies the full state of the former. Why should he not see grateful as the full state of being for a grate? Since both grate and plate are nouns and both grateful and plateful are adjectives, there are no syntactic cues to prevent the student from making the identification although there may be some semantic cues. The same argument could be used for such sets as read -- ready, cf. rain -- rainy, bite -- bitter, cf. dine -- dinner; blaze -- blazer, 'jacket,' cf. tease -- teaser and so on although the condition of the syntactic similarity of the sets does not necessarily hold true.

At this point, it should be noted that evidence used to refute the argument of morpheme identity as a criterion for establishing the validity of a spelling system is not to be used as evidence in favor of a phonetic or phonemic spelling. Grate greyt and grateful greytfəl ; read red and ready rediy preserve the same identity relation in phonemic or phonetic script that they have in conventional English orthography. It is evidence, however, which should be considered in an assessment of the validity of the morpheme identity criterion.

Besides this, arguments against that portion of the Chomsky and Halle position on English spelling which has heretofore been categorized as a pars pro toto argument are not necessarily

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directed against the principles on which that argument is based. For a language like English, which embraces a vast number of different dialects, a strictly phonetic or a phonemic alphabet would be an impossibility. Nevertheless, it is a questionable procedure to take one portion of English vocabulary, investigate this portion thouroughly and conclude from that investigation that all of conventional English orthography constitutes a "near optimal system." A much more defensible position would be one in which those portions of English orthography which manifest underlying or surface regularities of certain types should be highlighted and retained and those portions which manifest irregularities that cannot be defended on any general principles should be regularized. This kind of an approach may well require that words with the previously mentioned eugh or ea graphic forms be respelled.

Similarly, educators who are seriously studying the Chomskyan viewpoint on English spelling should try to make some assessment of the concepts "underlying phonological form" and "the representation of phonological segments on a more abstract level" and the implications of these concepts for the teaching of reading, writing and spelling. In essence, these concepts permit the creating of previously nonexistent forms which enable the linguistic theoretician to regularize a paradigm or to give rules a generalizing power which they would not otherwise have. In the heyday of structuralism, zero forms, zero allomorphs and so on were created to serve a similar purpose. Instances of these forms can be found in The Sound Pattern of English, but they are not too common in the rapidly growing literature on the application

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of information from this work to educational problems.

For instance, in the discussion of the stress placement on burlesque, ellipse, and cement, the underlying form for cement is postulated as /sEmente/. Evidently, it is necessary to have a "silent e" in the underlying form to make the stress of cement fall on the first syllable. In the same way, when a set such as enfránchise, propagándize, metamórphize is compared to a set such as skéletonize, álphabetize, prótestantize, it is necessary to assume that there is a marker, #, preceding the suffix -ize which shows that this suffix is neutralized so that the first syllable stress can be predicted for these items. The reverse of this kind of an argument is used to regularize other forms. Instead of postulating non-existent forms, elements which are actually present in the orthography are written as zero. This occurs in the discussion of items such as basically /beysɨkliy/ and publically /pəblikliy/. Here a rule is provided which writes the syllable -al in the spelling as zero. This rule is inapplicable for theatrically and neurologically and optional for ironically and analytically which evidently can be either /ayranɨkəliy/ or /ayranɨkliy/ and /ænəlɨtikliy/ or /ænəlɨtikəliy/.[18] At this point, the statement about English orthography being a near optimal system becomes almost meaningless. Not only is it necessary to postulate non-existent entities and to do away with irregularities which are present but even after this has been done there are instances which do not fit the rules thus created.

The foregoing comments are in no way to be construed as an indictment of the entire work by Chomsky and Halle. As Chomsky

has indicated elsewhere, the linguistic theoretician must be free to pursue his line of argument regardless of the practical consequences.[19] Within the framework of the theory that has been constructed, The Sound Pattern of English is a brilliantly written book by extremely competent scholars. Except for already noted reasonings and others like them, it is exceedingly difficult to find flaws in the argument or to fault the evidence. Furthermore, Chomsky and Halle must be commended for the humility with which they approach their subject matter: not infrequently is it possible to find statements such as "we do not know" or these matters "go beyond our present understanding."[20] By this, these authors demonstrate their humane-ness quite beyond the capability of their detractors. Similarly, neither of these scholars can be faulted for the flaws in the arguments of their epigones.[21] But, if in fact the ability to spell is just one more possession of the bureaucratic elite, and if in fact the belief of the bureaucratic elite about this ability is just one more of "their false beliefs about language" which they "use to the disadvantage of the deprived" and if in fact the current state of English spelling makes it easier for the children of the bureaucratic elite to learn how to read, write and spell, it seems to me to be ill-advised to argue that the current state of English orthography constitutes a "near optimal system."[22]

Another view of English spelling that has some currency at present is the viewpoint presented by Hanna, Hanna and others under the title, Phoneme-Grapheme Correspondences as Cues to Spelling Improvement (1966).[23] Although this study used a

massive corpus, 17, 310 words, largely from the Merriam Webster's New Collegiate Dictionary and cannot be faulted with the same kind of selectional bias as the Chomsky and Halle work, it has several serious defects. In the first place, the title is not even a rough approximation of the contents of the study. On page three, the authors cite the Trager-Smith phonemicization of English to arrive at 36 segmental phonemes in spoken American English; in their first attempt to adapt the Merriam Webster pronunciation key to phonemic theory, they arrive at a list of 62 phonemes for spoken American English. On the second attempt, they pare out some of the phonemes in their first count and thus arrive at a list of 52 significant phonetic units or phonemes. Furthermore, in some sense of the word or another, the computer that matched phonemes and graphemes in the study recognized silent /H/ and silent /E/ as phonemes although the researchers seemed willing to dignify these entities with the title of phoneme only reluctantly; the silent /E/ is included in the first count, but not in the second.[24]

Thus, these authors find that there are 244 different ways to spell their 22 vowel phonemes. Similarly, they find 134 spellings for 30 consonant phonemes. In all, they find 378 different ways to spell 52 phonemes. With this kind of evidence before them, that they can maintain belief in the statement, "American English is primarily an alphabetic language," is a revelation of their presuppositional bias: the number of cases in which phonemes are adequately represented by graphemes is more important than the number of graphemes that can represent any

given phoneme in determining the adequacy of the spelling in a language. At best, this is a preference for ranking quantity over quality since their conclusion is based on the fact that in 73% of the cases the phonemes were spelled accurately. At worst, their bias is simply an arbitrary preference for ranking one kind of quantification over another indetermining the quality of alphabetic representation of a spoken language.

If these authors would have used a more consistent phonemicization, their overall percentage of reliability may not have changed, but the quality of their phonemic-graphemic correspondences would have improved. Using the Pike-Fries phonemicization of standard English,[25] the number of graphs or combinations of graphs to represent the 14 vowels and diphthongs of American English can be set at 175 with some spellings that do not nearly fit the alphabetic principle. (See Table I.) A re-assignment of the consonant spellings to the Pike-Fries phonemicization yields 114 different spellings for 24 consonant phonemes. Thus the 38 segmental phonemes of English in the Pike-Fries inventory have 289 different orthographic representations in Tables IV and V of the Hanna study. So there are 89 fewer grapheme-phoneme correspondences in a more judicious selection of phonemic inventories for modern standard American English.

In adapting the items in the material from Tables IV and V of the Hanna study to the Pike-Fries phonemicization, it becomes obvious that mapping English phonemes into graphemes does not fully utilize the alphabetic principles on which the English spelling is based. This is especially true if the alphabetic principle requires

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that each English phoneme be mapped into one grapheme or graphic unit. It is quite easy to map the phoneme /j/ into the graphic unit, dge, but to map two phonemes into a single graphic unit is quite another matter. For instance, x generally represents two different sets of two phonemes, /ks/ or /gz/. In the Hanna study, this problem is handled inconsistently. A separate phoneme, /ks/, is established to take care of the x in fixed, but the x of exact is assigned to the phoneme /g/. No resolution of this problem is attempted in the re-assignment of the data to the Pike-Fries phonemicization; the x of fixed is assigned to /k/ and the x of exact, to /g/. An ad hoc solution within the framework of the Hanna study would be to assign x to /k/, /s/, /g/ and /z/. Obviously, at this point, English spelling is not as inconsistent as the simplistic model used here requires it to be.

In the re-assignment, economies were gained, for instance, by assigning the y of coyote and kayak to the off-glide in the diphthong /ay/ so that these two items are, phonemically, /kayowtiy/ and /kayæk/. (For convenience, Trager-Smith symbolization of English phonemes is used throughout the body of the paper although the phoneme inventory is that of Pike-Fries. The symbolization of the Pike-Fries notation is used in Table I.) In their assignment of coyote and kayak, Hanna and Hanna have two more spellings for the diphthong /ay/, ay and oy. In the re-assignment, since o as in dot and a as in wad already are spellings for the phoneme /a/, assigning the a of kayak and the o of coyote to /a/ preserved the dominant spelling pattern with the y of both of these items indicating the off-glide of the diphthong.

In the same way, even greater economies could be gained in both the Hanna study and the re-assignment by using a more realistic approach to the function of "silent _e_" in English spelling. Hanna and Hanna simply treat "silent _e_" as part of a disjunctive grapheme with the preceding vowel. Thus, the _a...e_ of _mate_ represents /ey/ and the _o...e_ in _note_ represents /ow/, cf. _mat_ and _not_. But, the _e_ of _marriage_ and _ounce_ certainly does not fulfill the same function. Here it indicates the "soft" pronunciation of _g_ and _c_, /j/ and /s/. Similarly, "silent _e_" in _value_, _tongue_ and _have_ is placed there by scribal tradition which does not permit _u_ or _v_ to occupy word final position. Recognition of these functions of the unit would permit a reduction of grapheme-phoneme correspondences by at least 20.

More differences between the re-assigned data and the original study were caused by several other factors. First, the dialect in the re-assignment differs from that of the original. In the Hanna study, _dahlia_ is assigned to the /a/ phoneme, but in the re-assignment, to /ey/. Thus also, _discern_ and _hussy_ have /z/, a voiced consonant in the Hanna study, but a voiceless consonant, /s/, in the re-assigned data. Second, the _l_ of _could_ and _talk_ are assigned to vowel spellings in the re-assignment but to consonants in the original study. Third, there are some mistakes in the assignment of phonemes to graphemes in the Hanna study: for example, the graphemes marking the unstressed vowels of _pirate_ and _senate_ are assigned to different phonemes. Regardless, however, of the questions of phoneme-grapheme fit or of phoneme inventories and their representation in English

orthography, in the face of the evidence. It is amazing that the statement about "the alphabetic" nature of the English language can be made; nevertheless, it would seem that the ad hoc nature of decisions in the study as indicated by the preceding discussion and the arbitrary assignment of phonemes to graphemes require serious re-appraisal of the conclusions reached by Hanna and his co-workers.

Furthermore, from this study, these researchers seemed to be very satisfied that the computer could, in effect, "spell" 50 of the 17,000 words with no error at all and 36 additional words in the corpus with only one error.[26] Now, if my twelve-year-old son were able to scan all possible spellings with lightning like speed and match them with his internalized pronunciations or pronunciation rules in computer-like fashion, I might be happy with the conclusion. I certainly would be happy with a teacher who would accept a 50 error rate in my son's spelling especially if the teacher would permit two or more errors in another 14% of the words which he spells. But since none of these factors hold true, I am afraid that I have more sympathy for my son in his struggle to master English spelling than I have with the Hanna study.

One other view of English spelling that deserves to receive a great deal of attention is the view of Richard L. Venezky. This view, although it also capitalizes on the regularities in English spelling in a manner similar in some respects to that of Chomsky and Halle or to that of the researchers in the Hanna study, differs in the method used to approach the

matter. Chomsky and Halle start with their conception of language which owes much to the Saussurian concept of langue and is inextricably interwoven with their concepts of deep structure (as an abstraction), linguistic competence and underlying forms. They then move on to show how the deep structure of language is mapped into the phonological surface forms on the one hand and the graphological surface forms on the other. Thus the phonological forms are related to the graphological forms only indirectly insofar as both relate to an abstraction, language, or the rules of language and linguistic universals. In the Hanna study, phonological surface forms, "phonemes," are mapped directly into graphological surface forms, "graphemes." Because of the problems previously noted, this process is not reversible in this study. In the Venezky study, the procedure is reversed. Graphemic words are mapped into morphophonemic units and then into phonemes. This process is also not reversible. (For a schematic representation of these three views, see Figure 1.) Researchers in the Hanna study start with 52 phonemes and map them into the 26 letters of the alphabet and an un-numbered set of combinations of the letters used in spelling English. Venezky starts with 50 major and minor relational units composed of the 26 letters of the English adaptation of the Roman alphabet and 33 combinations of these letters which form significant graphic units. He then maps these into the inventory of sounds in modern English put forward by Hans Kurath. This inventory corresponds exactly to what has heretofore been designated the Pike-Fries phonemicization of English.

Besides the very real differences in strategies employed in these three studies, there are differences in the emphases given to viewpoints resulting from these strategies. Chomsky and Halle are more likely to take into consideration the historical changes in surface phonological forms although they state that the current form takes precedence over its historical development in a contemporary description.[37] Venezky is more likely to look at the historical development of the orthography and use this as a basis for assigning graphemic-phonemic correspondence. The researchers in the Hanna study disregard both the historical development of the orthography and the historical development of English sounds; hence, the validity of the Hanna study rests more heavily on the somewhat arbitrary decisions made by the researchers in assigning particular phonemes to individual graphemes. Furthermore, since Venezky is not primarily concerned with stress placement and affixation as are Chomsky and Halle, his work deals more completely with the mono-morphemic Germanic segment of English vocabulary. But on the other hand, he does not neglect the effect of affixation on phoneme-grapheme correspondences in his corpus of 20,000 most commonly used words in English, relating the spelling of prefixes and suffixes to their bases wherever possible.

As a result of his study, Venezky asopts a viewpoint on the English orthography similar to that of Chomsky and Halle. He states this viewpoint in the following words:

The spelling of the base form of a word tends to be

> phonemic -s/ not in the one-letter one-sound system that has become the Holy Grail of many educators and linguists, but in a more graphemically economical fashion whereby position, environment, and overt markers allow the same symbol to perform several distinct functions; and whereby several symbols represent the same sound. (That homo sapiens is somehow more at ease with a one-letter one-sound system has often been assumed, but no evidence has ever been produced to substantiate this limitation on man's mental capacities.)[28]

At this point, it is interesting to note that Venezky does not make quite as strong a claim for the English orthographic system as Chomsky and Halle do. He simply suggests that spelling systems based on criteria other than the one-phoneme to one-grapheme principle may be ultimately the most economical.

Venezky's statements about the beneficial aspects of English orthography tend to be quite moderate. This may be related to the fact that, as a result of his computer-based study, he may grasp more than the other writers the complexity of the rules necessary to describe the regularities of English spelling and the number of irregularities which do not find inclusion within the rules. In the work under discussion, there are approximately 150 rules which range in complexity from "q corresponds regularly with /k/"[29] to the following series of related rules:

> Before final -ll and medial or final -l plus another consonant, a corresponds not to /æ/, but to /ɔ/ as in

almanac, alternation, call, chalk, mall, psalm, and walk. This shift does not occur before medial _ll_, however. Compare, for example, the following: call: calliper; fall: fallacy; gall: gallow; hall: hallow; mall: mallard; tall: tallow. In addition, _o_ before final -ll or medial _l_ plus consonant corresponds to {o} rather than to {a}. Thus,

bold	polka	boll: bollard
folk	scold	poll: pollen . . .

With the exception of the _a + l_ patterns discussed above, _a_ preceded by inital _w_ in a checked environment corresponds to {æ} before spelling for velars ({k, g, ŋ}) and to {a} otherwise. Compare, for example, wad, waffle, wander, wasp: wax, wag, waggle, wangle.[30]

A study of the Venezky work reveals that the letters of the alphabet function according to five different kinds of rules or on five different levels: phonemic, morphemic, syntactic, phonotactic, and graphotactic. Most of these different kinds of rules can be demonstrated with reference to the so-called "silent _e_" of English orthography:

(1) Phonemic: "Silent _e_" indicates the quality of a preceding vowel.

mate /meyt/	mat /mæt/
mete /miyt/	met /met/
note /nowt/	not /nat/
cute /kyuwt/	cut /kət/

(2) Morphemic: "Silent _e_" is added to forms so that they

avoid the appearance of ending with a final -s plural marker. Thus, if it were not for the final -e, moose, goose, and mouse might be mistaken for plurals.

(3) Syntactic: Most two letter words in English fall into the grammatical class that C. C. Fries called function words. "Silent e" is added to some words to differentiate them from this class of words. Compare see and me, wee and we, rye and my, do and doe, to and toe.

(4) Graphotactic: According to scribal practices which developed during the Middle English period, the letter v is not allowed to stand in word final position. Hence, "silent e" is added to words which would otherwise end with the letter v. See, for instance, glove, have and love.[31]

(5) Phonotactic: The b in sub and the p in pet relate to units in the spoken language on the basis of phonemic rules. When these two letters are brought together in a single word composed of two morphemes as in subpoena or clapboard, they are related to the spoken forms by a phonotactic rule which skips the first member of the sequence and reads the value of the second as the surface phonological realization.[32]

Even though Venezky's approach to English spelling is as sophisticated as the preceding excerpts indicate, there are over 500 words in his short study which manifest irregularities that are difficult to describe by the suggested rules.

In the summary of his study, Venezky recognizes the bi-polar

nature of English spelling, which he calls the phonemic and morphemic tendencies.

> The phonemic and the morphemic tendencies are equally strong; morphemic indentity is seldom preserved at the expense of the more general phonemic patterns, and the general phonemic patterns, from all appearances, tend to preserve morphemic identity.[33]

That Venezky should see the morphemic and phonemic tendencies in English spelling as equally strong appears contradictory for even those writers who appeal to the morpheme identity criterion do so on the basis of the phonemic tendency or the alphabetic principle. That is, those who argue for the correctness of the spelling bomb or vehicle do so on the basis of the fact that the silent _b_ or the silent _h_ is actually pronounced when suffixes are added to the base forms of the words as in vehicular and bombastic. This would seem to be clear evidence that in their minds the phonemic basis of the alphabet takes precedence over the morphemic basis. For this reason, how anyone could argue for the correctness of the spelling of climb or marihuana is beyond imagination.[34] Similarly, that Venezky can declare his belief in the statement, "morphemic identity is seldom preserved at the expense of the more general phonemic patterns" is a tribute to his precise use of language. Morphemic identity is most frequently preserved at the expense of the phonemic nature of English spelling. For instance, in at least one member of each of the following sets the alphabetic nature of English orthography is violated: damn -- damnable;

do -- does; woman -- women, colony -- colonial. In damn, the letter n relates to no phoneme whatsoever. In does, the morpheme do is preserved neatly but the alphabetic principle would give a pronunciation similar to does, 'two female deer,' goes or toes. That the actual pronunciation of the verb does is /dəz/ represents crass violation of the phonemic tendency. Similarly, the set woman -- women does a beautiful job of preserving morpheme identity, creating a plural by analogy to man -- men in the process, but it violates the phonemic nature of the alphabetic principle by creating the only instance in English where /i/ is spelled by o. In the same way, the spelling, colonial, preserves the morpheme identity of colony well, but it produces a pronunciation of o as /ow/ where /ə/ would be expected. The same could be said for at least one of each of the following sets which preserve the morpheme identity criterion beautifully but violate the alphabetic principle, the phonemic tendency, of the dominant spelling patterns of English: soft -- soften; say -- says; pray -- prayer; cough -- hiccough; hand -- handkerchief; know -- knowledge; danger -- dangerous; interest -- interesting; comfort -- comfortable; whale -- whaling; peddle -- peddler; create -- creature; clean -- cleanse; white -- whitish and so on. But Venezky is right. Even in some of the above instances, the general phonemic "patterns" are preserved as in the pattern le which regularly spells /əl/ and works beautifully for peddle and peddler. But the set comfort--comfortable /kəmfərt/ -- /kəmfərtəbəl/ uses another pattern for dealing with the same linguistic phenomenon, vowel reduction with suffixation. Similarly, sane -- sanity preserves the phonemic

pattern where a. . . .e regularly represents /ey/ and the a represents /æ/ as in can. Or should the phonemic tendency require conformity to the pattern tame -- tamable to produce sane -- *sanity? The point is simply this: there are so many "general phonemic patterns" in English spelling that at least one of them can be found to preserve the morphemic identity criterion. Thus, the Venezky statement is not particularly meaningful and it is surprising, therefore, that he states: "There is no valid basis, either diachronic or synchronic, for claiming that the current orthography should be anything in particular other than what it is."[35]

From this review of English spelling, can it be determined that the current orthography is especially difficult for the lower classes? To suggest an answer to this question would require some indication that the English orthography presents more problems for the children of the disadvantaged than it does for the children of the advantaged. From the preceding discussion, it would appear that the English orthographic system is unnecessarily difficult for all those who are trying to master it because of the irregularities in it. Beside this, John B. Carroll has suggested that the Chomskyan notion of language as rule-governed behavior does not find any real manifestation in actual linguistic behavior and he has made this suggestion on the basis of evidence from the morpheme identity criterion that has been used to support the correctness of current English spelling.[36] Furthermore, the transformationalists themselves are caught in a neat equivocation on this very subject. They generally refuse to make any strong

claims about the psychological reality of the rules which they propound but they are quite willing to make recommendations to educators as if their rules had psychological reality. A good example of this is found in Wardhaugh, who states:

> These readers (the readers of the English orthography) have available a set of phonological habits (or rules) which determine how they pronounce what they recognize; an economical orthography does not need to be concerned with these habits, since native speakers have no choice but to behave in certain ways in pronouncing words and structures they recognize. . . . First no claim is made that the phonological rules are "psychologically real" or even that they are fully correct, since the whole book is presented as a report of "work in progress" and not as a definitive study. Chomsky and Halle offer no more than a tentative model of an ideal system. . .[37]

In the first sentence of the quotation, phonological rules are equated with phonological habits; in the second part of the quotation, the statement is made that phonological rules have no psychological reality. This is tantamount to saying that habits have no psychological reality or, by extension, that habits have no correlates in the psychological mechanisms of the human individual. In all fairness to Chomsky and Halle and those who espouse their cause, these authors are probably saying that their own particular rules which they invent do not necessarily have correlates within the human neurological mechanisms. But if this

is so, it may be a little too early in the development of transformational thought to argue that the English conventional orthography is a near optimal system and to start development of educational programs based on the assumption that it is.

Regardless of the arguments and counterarguments about the effectiveness of English spelling, Chomsky himself offers evidence that the English orthography favors the advantaged. He himself admits that ". . . conventional orthography corresponds to a level of representation that seems to be optimal for the sound system of a fairly rich version of . . . spoken English."[38] From the content of the Chomsky and Halle The Sound Pattern of English, it would appear that this rich version of English contains a highly latinate vocabulary. Now, if the children of the working classes and the hard core poor have less contact with this "rich version of spoken English," and there is evidence that they do,[39] then it follows that they are at a disadvantage in learning to use the conventional orthography of English.

Furthermore, it is freely admitted that the conventional orthography does not function very well for foreigners learning English as a second language.[40] Now, there are linguists who maintain that Black English (nonstandard Negro English) is indeed a different language from standard English.[41] These linguists suggest that Black English has developed from a creolized language with a Portuguese base. If this argument has any validity to it whatsoever, then it would follow that Black children who speak a nonstandard Negro dialect of English have a greater difficulty with English spelling than white children who speak a rich version

of standard English. In addition, if the English spelling system is based on the alphabetic or phonemic principle to some extent, and there is no linguist who would deny that it is, then the speaker of a nonstandard dialect is placed at a disadvantage in learning to read, write and spell. That this is true can be demonstrated in terms of the previously mentioned concept, loss of confidence in the alphabetic principle, and in terms of the concept of match or mis-match between spoken and written forms of the language. Both of these concepts are crucial in the currently popular phonics approaches to the teaching of reading.

Thus the speaker of nonstandard negro English who consistently terminates words such as truth, tooth, with and so on with the phoneme /t/ or who interchanges /t/ and /θ/ in final position in words such as these must learn one more phoneme-grapheme correspondence for the digraph, th, than the child who does not. Similarly, he has extra difficulty when he is required to write items like desk -- desks and post -- posts; in his dialect he often must match these with phonological forms such as /pows -- powsiz/ and /des -- desiz/. At this point, however, the Black child is not the only child to face an unfairly difficult orthography. Speakers of many Southern dialects are at the same disadvantage in learning to read or spell items such as pin or pen because they normally have a single vowel, /i/, before /n/ and the other nasals. Thus also, to a certain extent, a speaker of a dialect in which the third singular form of the negative is don't as in He don't do it very often is faced with the same

problem when he is forced to read or write the sentence He doesn't do it very often. Here the form enshrined by the orthography discriminates against all those speakers throughout the country who use so-called non-standard forms to the exclusion of standard forms. At this point, then, the current spelling system is especially discriminatory towards speakers of the lower class dialects, including speakers of nonstandard negro English.

Without doubt, then, from the basis of knowledge such as this, Carol Chomsky quite correctly argues that:

> Lexical spellings represent the meaning-bearing items directly, without introducing phonetic detail irrelevant to their identification . . . (and that) words whose spelling is phonetically accurate do not constitute a distinct and meaningful category in the language.[42]

But her argument which starts from these premises and leads to the conclusion that the child should be first taught using some kind of phonetic decoding process and then shifted away from "the phonetic aspects of spelling to a consideration of the underlying lexical properties of the orthographic system"[43] leaves some logical steps suppressed. If Carol Chomsky's argument is correct and there is no "distinct and meaningful category" of words "whose spelling is phonetically accurate" in English, it may be that transformationalists would like educators to return to sight-recognition methods for the teaching of reading.

Of the preceding writers on the English orthography, Venezky seems to have the most accurate assessment of the effect of

irregularities on the spelling rules that can be formulated. First he distinguishes between predictable and unpredictable patterns of English spelling. In the predictable class, he places all those items which can be described by graphemic, phonemic, or morphemic rules. All other items are grouped into the unpredictable class. He then states:

> In the unpredictable class, the low frequency patterns should not be presented as letter-sound or sound-letter patterns since this may encourage transfer to inappropriate situations. The high-frequency patterns cannot, in a strict sense, be transferred either, since there is no way to predict where they apply. (Italics mine.)[44]

The reality of Venezky's observation can be demonstrated by a short self-administered test. In the following list, there are ten nonsense syllables. Their pronunciation is governed by a rule which applies in 80% of the cases. For these cases, eight instances, the symbol o is to be pronounced /a/. In the other two cases, it is to be pronounced /æ/ in one instance and /ɔ/ in another.

1. gon	4. ton	7. not	10. noth
2. kon	5. zon	8. noz	
3. bon	6. lon	9. nos	

Theoretically, and as the items stand in a list, it is quite easy to attain an 80% accuracy in the pronunciation of the symbol o. In each case, the o should be read as /a/, two of the items would be read incorrectly and the 80% accuracy would be attained.

But this kind of accuracy is not of much use to the student because few teachers will accept an 80% accuracy in reading. Besides this, in actual practice, students tend to anticipate the expected irregularities reading /æ/ or /ɔ/ for random instances and thus their accuracy diminishes to as low as 60% or even less. In the learning of natural language, this phenomenon has been termed hypercorrection by William Labov and the misapplication of analogical formations by Marckwardt and Ney. It occurs, for instance, in the child's learning of irregular plurals in English. Very often, the child will pluralize <u>foot</u> as <u>foots</u>. Upon correction, he does not move directly to <u>feet</u> but arrives at the correct form after going through a stage in which he uses <u>feets</u>. In this way, a single irregularity does not produce the possibility of only one error; it is more likely to produce the possibility of two errors. It is for this reason that Lesgold and Bower have found that, in learning a paired associate task with irregularities in it, experimental subjects tend to do better without the partially effective rule.[45] And it is for this reason that, however many rules can be described to embrace the somewhat erratic nature of English spelling, as long as inexplicable irregularities remain, the English spelling system will be an inefficient system. (For the example above, a correct reading requires the pronunciation of /bɹɛn/, item 3, and /nɔf/, item 7.)

So then, what of the current state of English spellings? It may well be that current researchers in linguistics have demonstrated that they are considerably more reliably governed by rule than previously supposed. But certainly, given the now known

principles on which the English orthographic system is constructed, it should be possible to construct a spelling system that exploits these principles to better advantage than the present one. Haugen himself, from his intimate knowledge of the Norwegian situation and its spelling reforms, feels that in a multi-dialect situation spelling should not be an "exact transcription of speech" but should reflect morphemically relevant details.[46] What this means in terms of the present orthographic system must be largely a matter of speculation. It may mean simply that children should be taught how to read by using the spelling which they themselves invent as in the language experience approach. It may mean that in the beginning stages of the teaching of reading, writing and spelling a locally contrived version of the initial teaching alphabet should be used, a version which fits the dialect and the idiom of the students who learn from it.[47] It may mean that a modified reform of English spelling should be attempted, a reform which seeks only to remove irregularities from the present system. Judging by the lack of success attendant on other spelling reforms, however, there would seem to be little hope in reforming the present state of the orthography, discriminatory though it may be. In any case, it is quite one thing to be slave to a spelling system which has far too many irritating irregularities. It is quite another thing to be in love with that slavery.

FOOTNOTES

[1]Donald J. Lloyd and Harry R. Warfel, American English in its Cultural Setting (New York: Alfred A. Knopf, 1956), pp. 358 - 359.

[2]Thorstein Veblen, The Theory of the Leisure Class (New York: The Viking Press, 1931), p. 399.

[3]Malcolm P. Douglass, "The Development of Teaching Materials for Cultural Pluralism" (Paper prepared for the Conference on Education and Teacher Education for Cultural Pluralism sponsored by the Leadership Training Institute, United States Office of Education and the Northeast and Midwest Clusters of the Training of Teacher Trainer's Program, Chicago, May 12 - 14, 1971), p. 1.

[4]Einar Ingvald Haugen, Language Conflict and Language Planning (Cambridge, Mass.: Harvard University Press, 1966), pp. 303 - 304.

[5]Malcolm P. Douglass, "Beginning Reading in Norway," The Reading Teacher, 23 (Oct. 1969), 17 - 24, 47.

[6]Haugen, Language Conflict, p. 48

[7]Ibid., p. 52.

[8]Ibid., p. 154.

[9]Noam Chomsky and Morris Halle, The Sound Pattern of English (New York: Harper and Row, 1968), p. 49.

[10]Ralph W. Fasold, "Orthography in Reading Materials for Black English Speaking Children," Teaching Black Children to Read, ed. Joan C. Baratz and Roger W. Shuy (Washington, D.C.: Center for Applied Linguistics, 1969), pp. 71 - 72.

[11]Ibid., pp. 72 - 74.

[12]William Labov, "Some Sources of Reading Problems for Negro Speakers of Nonstandard English," Teaching Black Children to Read, p. 62.

[13]Chomsky and Halle recognize that certain rules require the separation of English vocabulary into words of Germanic, Romance and Greek origin. They then argue that this classification in some sense or another is represented in the internalized grammar. The Sound Pattern of English, p. 373.

[14]Ronald Wardaugh, Reading: A Linguistic Perspective (New York: Harcourt, Brace and World, 1969), pp. 109 - 110, 113.

[15]The treatment of muscle -- muscular is a reaction to that of Carol Chomsky, "Reading, Writing and Phonology," Harvard Educational Review, 40 (1970), 287 - 309.

[16]Chomsky and Halle, The Sound Pattern of English, pp. 234, 230.

[17]Ibid., p. 50.

[18]Ibid., pp. 146 - 148, 154, 88.

[19]Noam Chomsky, "Linguistic Theory," Language Teaching: Broader Contexts, ed. Robert J. Mead, Jr. (Reports of the working Committees, Northeast Conference on the Teaching of Foreign Languages, 1966), pp. 43 - 49.

[20]Chomsky and Halle, The Sound Pattern of English, p. 176.

[21]Roman Jakobson as quoted by Ved Mehta, "Onward and Upward with the Arts," The New Yorker (May 8, 1971), p. 79.

[22]In a controlled experiment with native and non-native speakers of English, H. Douglas Brown has demonstrated that native speakers are as poor as the non-native speakers in spelling low frequency, high regularity words. He concludes from this that

English spelling rules are not in any sense internalized. "Categories of Spelling Difficulty in speakers of English as a First and Second Language," Journal of Verbal Learning and Verbal Behavior, 9 (1970), 232 - 236.

[23]Paul R. Hanna, Jean S. Hanna, Richard E. Hodges and Edwin H. Rudorf, Jr., Phoneme-Grapheme Correspondences as Cues to Spelling Improvement (Washington, D.C.: U. S. Government Printing Office, 1966).

[24]Ibid., pp. 16 and 20.

[25]Robert C. Lado and Charles C. Fries, English Pronunciation (Ann Arbor, Mich.: The University of Michigan Press, 1954).

[26]Hanna, Phoneme-Grapheme Correspondences, Table 22, p. 119.

[27]Chomsky and Halle, The Sound Pattern of English, p. 28.

[28]Richard L. Venezky, The Structure of English Orthography (The Hague: Mouton, 1970), p. 121.

[29]Ibid., p. 81.

[30]Ibid., p. 112

[31]Ibid., pp. 55 - 58.

[32]Ibid., p. 44.

[33]Ibid., p. 121

[34]This criticism of the morpheme identity criterion is not applicable to the vowel spellings since visual representation of morphemes generally does not involve "silent" vowel letters.

[35]Venezky, Orthography, p. 123.

[36]John B. Carroll, "Current Issues in Psycholinguistics and Second Language Teaching," Research Memorandum (Princeton, N.J.: Educational Testing Service, 1971), p. 6.

[37]Ronald Wardaugh, Reading: A Linguistic Perspective (New York: Harcourt Brace, 1969), p. 119.

[38]Noam Chomsky, as quoted by Carol Chomsky, "Reading," p. 301.

[39]Rosalie Cohen, Gerd Fraenkel, and John Brewer, "Implications for 'Culture Conflict' from a Semantic Feature Analysis of the Lexicon of the Hard Core Poor," Linguistics, 44 (1968), 11 - 21.

[40]Carol Chomsky, "Reading," pp. 296, 311. See also Chomsky and Halle, The Sound Pattern of English, 49 and 50.

[41]William A. Stewart, "Sociolinguistic Factors in the History of American Negro Dialects," The Florida Foreign Language Reporter, 5 (Spring 1967). See also J. L. Dillard, "Negro Children's Dialect in the Inner City," The Florida Foreign Language Reporter, 5 (Fall 1967).

[42]Carol Chomsky, "Reading," pp. 298 - 298.

[43]Ibid., p. 297.

[44]Venezky, Orthography, p. 127.

[45]Alan M. Kesgold and Gordon H. Bower, "Inefficiency of Serial Knowledge for Associative Responding," Journal of Verbal Learning and Verbal Behavior, 9 (1970), 456 - 466.

[46]Haugen, Language Conflict, p. 302.

[47]The Initial Teaching Alphabet of Sir James Pitman does not satisfy a strict phonemicization of English and it does not preserve the morpheme identity criterion much better than the conventional orthography. See Wardaugh, Reading, pp. 25 - 27, and John Downing, Evaluating the Initial Teaching Alphabet (London: Cassell, 1967), pp. 98 - 101.

TABLE I: Re-assignment of Data from Hanna and Hanna Tables IV and V to Pike-Fries Phonemicization of American English

Vowels

Phoneme	Grapheme	Conventional Spelling
/i/	AE	algae
	E	be, senior
	E...E	eve, theme
	EA	beat,*guinea
	EA...E	ease, please
	EE	**ee**l, feel
	EE...E	geese, freeze
	EI	ceiling
	EI...E	seize
	EO	people
	EY	key,*donkey
	I	ski, motif
	I...E	naive, elite
	IE	chief,*varied
	IE...E	piece, believe
	OE	amoeba
/ɪ/	E	pretty
	E...E	privilege
	EE	been
	EI	forfeit
	I	did
	I...E	give
/ɪ/	IE...E	sieve
	O	women
	U	busy
	UI	build
	Y	larynx
	Y...E	apocalypse
/e/	A	angel
	A...E	ate, mediate
	AI	aid, pain
	AI...E	aide, praise
	AIGH	straight
	AU...E	gauge
	AY	way,*yesterday
	AY...E	aye
	AH	*dahlia
	E	cafe
	E...E	fete
	EE	matinee
	EA	break, yea
	EI	vein
	EI...E	seine
	EIGH	eight, weigh
	ET	beret
	EY	they

(*) Indicates that the item was assigned to a different phoneme by Hanna and Hanna.

TABLE I: Re-assignment of Data from Hanna and Hanna Tables IV and V

Vowels

Phoneme	Grapheme	Conventional Spelling
/ɛ/	A	any, *vary
	AE	aerial
	A...E	*care
	AI	said, *air
	A....E	*millionaire
	AY	says
	E	bet, end
	E...E	edge, *ere
	EA	head, *bear
	EA...E	cleanse
	EI	heifer, *their
	EO	leopard
	EY	*eyrie
	IE	friend
	U	bury
/æ/	A	cab
	A...E	madame
	AI	plaid
	AL	*calf, half
	AL...E	*halve
/ə/	A	spinach,*near
	A...E	orange,*senate
/ə/	AI	captain,*villain
	AU	epaulet
	E	*deer,*pier
	E...E	*licence,*verse
	EA	pageant,*learn
	EA...E	mileage,*hearse
	EO	pigeon
	EOU	courageous
	EU	*amateur
	I	civil, *bird
	I...E	*dirge
	IA	parliament
	IA...E	marriage
	IE	proficient
	IE...E	patience
	O	son,*word
	O...E	come, worse
	OI...E	tortoise
	OO	blood
	OU	touch, *glamour
	OU...E	*scourge
	U	medium, *up, *burn
	U...E	*measure, *minute

(*) Indicates that the item was assigned to a different phoneme by Hanna and Hanna.

TABLE I: Re-assignment of Items from Hanna and Hanna Tables IV and V

Vowels

Phoneme	Grapheme	Conventional Spelling	Phoneme	Grapheme	Conventional Spelling
/ə/	Y	idyll,*satyr	/u/	OUGH	through
/a/	A	wad,*kayak,*arm		U	truth, *feud
	A...E	are		U...E	rude, *deuce
	AU	bah		UE	blue
	AU	*aunt,*laugh		UI	fruit, suit
	AI	*said		UI...E	juice
	E	*encore,*sergeant	/ʊ/	EU	pleurisy
	EA	*heart		O	woman
	O	odd, dot		OO	wood
	O...E	dodge		OUL	could, would
	OW	knowledge		U	put, plurality
/ɑ/	AU	*beauty	/o/	AU	hauteur
	EU	sleuth		AU...E	mauve
	EW	shrewd, *view		EAU	beau
	IEU	*lieu		EW	sew
	O	who		EO	*yeoman
	O...E	lose		O	only, both, so
	OE	canoe		O...E	code, ode
	OO	boot, too		OA	oak, coat
	OO...E	choose, booze		OE	doe
	OU	soup, you		OH	ohm
	OU...E	route		OU	*soul

(*) Indicates that the item was assigned to a different phoneme by Hanna and Hanna.

TABLE I: Re-assignment of Data from Hanna and Hanna Tables IV and V

Vowels

Phoneme	Grapheme	Conventional Spelling
/o/	OUGH	dough
	OW	own, sow
	OW...E	owe
ɔ	A	also, water
	AL	hall, talk
	AO	extraordinary
	AU	auction, laud
	AU...E	cause
	AUGH	caught, aught
	AW	dawn, law
	AW...E	awe, aweful
	O	cord, off
	O...E	gone, horse
	OA	broad
	OA...E	*coarse
	OO	*door
	OU	*four
	OU...E	*course
	OUGH	bought
/ɔɪ/	OI	oil, coil
	OI...E	voice
ɔɪ	OY	boy
	OY...E	gargoyle
	UO	buoyant
/au/	OU	out, bout
	OU...E	ounce, house
	OUGH	bough
	OW	owl, towel
	OW...E	browse
/ai/	AI...E	aisle
	EI	stein
	EIGH	height
	EY	geyser
	EY...E	eye
	I	icing, china
	I...E	ice, like
	IE	tried, pie
	IGH	night, high
	UY	buy
	Y	typist, by
	Y...E	type, dye

(*) Indicates that the item was assigned to a different phoneme by Hanna and Hanna.

TABLE I: Re-assignment of Data from Hanna and Hanna Tables IV and V

Consonants

Phoneme	Grapheme	Conventional Spelling
/p/	P	pad, apt, cap
	PP	stopped, apple
/t/	BT	debt
	CHT	yacht
	PT	ptomaine
	ED	paced
	T	tab, its, bet
	TH	thyme
	TT	putt
	TW	two
/č/	C	cello
	CH	chart
	T	culture
	TCH	watch
	TI	question
/k/	C	cab, act, arc
	CC	occupy
	CCH	saccharin
	CH	chorus, echo
	CK	back, cracked
/k/	CQ	acquiesence
	K	keep, ski
	KH	khaki
	Q	liquid
	QU	bouquet
	SC	viscount
	X	*fixed
/b/	B	bad
	BB	ebb
/d/	D	dad, ads, ad
	DD	odds, odd
/ǰ/	D	educate
	DG	budget
	DI	cordial
	DJ	adjust
	G	gem, legend
	GG	exaggerate
	GI	region
	J	jam, project
/g/	G	gap, beg

(*) Indicates that the item was assigned to a different phoneme by Hanna and Hanna.

TABLE I: Re-assignment of Data from Hanna and Hanna Tables IV and V

Consonants

Phoneme	Grapheme	Conventional Spelling
/g/	GG	egg
	GH	ghost, burgh
	GU	rogue
	X	exact
/f/	F	farm, aft
	FF	cuff
	FT	often
	GH	rough
	PH	phone, sphere
/θ/	TH	thaw, bath
/s/	C	cent, acid
	PS	psalm
	S	sit, ask, bus
	SC	scene,*discern
	SCH	schism
	SS	depressed
	ST	listen
	SW	sword
	Z	eczema
/š/	C	oceanic
/š/	CE	ocean
	CH	echelon
	CI	social
	S	sugar
	SC	crescendo
	SCH	schwa
	SCI	conscious
	SH	ship, wish
	SI	pension
	SS	pressure
	SSI	mission
	T	negotiate
	TI	action
/v/	F	of
	V	vat, civic
/ð/	TH	the, clothes
/z/	CZ	czar
	ES	goes
	S	design, as
	SS	dessert

(*) Indicates that the item was assigned to a different phoneme by Hanna and Hanna.

TABLE I: Re-assignment of Data from Hanna and Hanna Tables IV and V

Consonants

Phoneme	Grapheme	Conventional Spelling
z	Z	zoo, adz
	ZZ	buzz
ž	G	regime
	S	usual
	SI	fusion, vision
m	GM	phlegm
	M	man, imp
	MB	lamb
	MM	mummy
	MN	hymn
n	GN	gnat, sign
	KN	knee
	MN	mnemonics
	N	nap, and, man
	NN	inn
	PN	pneumonia
ŋ	N	bank, anchor
	NG	length, long
	NGUE	tongue
w/	OU	bivouac
	U	liquid
	W	we, sweet
y	E	azalea
	I	senior, fiord
	Y	yes
h	H	hog
	WH	who
r	R	rap, far
	RH	rhyme
	RR	purr
	WR	wrap
l	L	lad, cliff
	LL	overalls
	SL	island

(*) Indicates that the item was assigned to a different phoneme by Hanna and Hanna.

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TABLE 11: Sounds-to-Representative Mappings of Phonemes into Graphemes from Hanna Tables IV and V to Pike-Fries Re-assignment

Problem Areas

Vowels

I. One graphic unit representing two phonemes*

yu — yu n y ɔ n / yu r / v ɔ l yn
u n i o n / u se / v a l ue

cf. — y y u / f y u d / b y u t i
y l ow / l e u d / b e au t y

ɔ r — h ɔ / s y y ɔ u ɔ r / h yɔ r o
s aw / s aw o p i e / h`e ro

ɛr — p ɔ r / d y ɔ r / n y ɔ r
p ie r / f e u r / n e a r

II. One phoneme with no representation by a graphic unit

ə — k i t ə ɔ n
ob a s e

/

Consonants

I. One graphic unit representing two phonemes*

ks — n t ks / I ks /
n e x t / i x ed

gz — ɛ gz ɔ k t
e x a c t

II. Metathesized relationship of phoneme to grapheme

l — f ə i z ɔ l / p u ɔ l / cf. / i z ɔ l /
wo m a l ize / a b l e / ea s e l

*When graphemes are mapped into phonemes, this problem does not occur since it is quite easy to map one unit into two as, for instance, the mapping of x into ks.

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FIGURE 1: Schematic Representation of Three Approaches to Relating English Sounds to English spelling

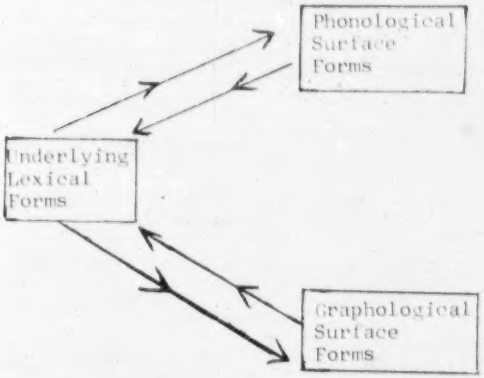

Diagram A: The Chomsky and Halle Procedure: Underlying lexical forms are mapped into phonological surface forms on the one hand and graphological surface forms on the other.

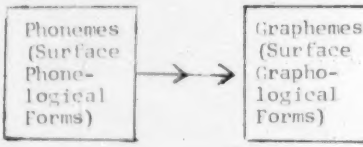

Diagram B: The Procedure in the Hanna Study: Phoneme (phonological surface forms) are mapped directly into graphemes (graphological surface forms.)

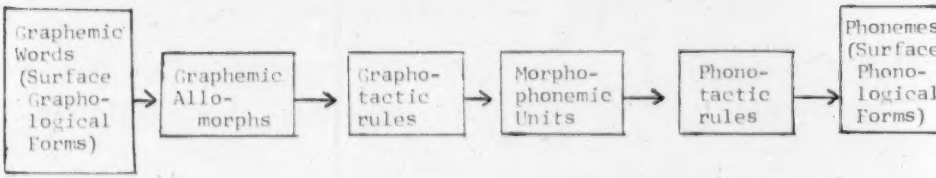

Diagram C: The Venezky Procedure: Surface graphological forms (graphemic words) are mapped into surface phonological forms (phonemes) through a series of intermediate stages. The Venezky procedure is not necessarily more complex than the procedure employed by Chomsky and Halle although the diagram may seem to indicate that it is.